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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/757,252	01/13/2004	Denise M. Eppich	MI22-2468	4388

21567 7590 10/15/2004

WELLS ST. JOHN P.S.
601 W. FIRST AVENUE, SUITE 1300
SPOKANE, WA 99201

EXAMINER

FENTY, JESSE A

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 10/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/757,252 ✓

Applicant(s)

EPPICH ET AL.

Examiner

Jesse A. Fenty

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 69-94 is/are pending in the application.
- 4a) Of the above claim(s) 82-94 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 69-81 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 69-94 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. This application contains claims directed to the following patentably distinct species of the claimed invention:

- a. A CMOS device; and
- b. A capacitor construction.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claims are generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the

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examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

2. During a telephone conversation with David G. Latwesen on 10/13/04 a provisional election was made without traverse to prosecute the invention of the CMOS device, claims 69-

81. Affirmation of this election must be made by applicant in replying to this Office action.

Claims 82-94 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

3. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Information Disclosure Statement

4. The information disclosure statement filed 10/04/04 fails to comply with 37 CFR 1.98(a)(1), which requires a list of all patents, publications, or other information submitted for consideration by the Office. It has been placed in the application file, but the information referred to therein has not been considered.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 69, 73, 74, and 76-81 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tonti et al. (U.S. Patent No. 6,436,749 B1) in view of Chau et al. (US 2003/0129793 A1).

In re claims 69, 73, 76 and 77, Tonti (Figs. 4, 4A) discloses a semiconductor device comprising:

A dielectric layer (10) over a substrate;

A PMOS gate (FET 36) and an NMOS gate (FET 34) over the dielectric layer;

A first metal-containing material (16) within the PMOS gate and over the dielectric layer, the first metal-containing material having a thickness of greater than 20 angstroms;

A second metal-containing material (16) within the NMOS gate and over the dielectric layer, the second metal-containing material having a thickness of less than or equal to about 20 angstroms;

A first layer of n-type doped silicon within the PMOS gate and over the first metal-containing material; and

A second layer of n-type doped silicon within the NMOS gate and over the second metal-containing material.

Tonti discloses a tungsten-nitride metal-containing layer but does not expressly disclose the first metal containing layer having a thickness of greater than 20 angstroms nor the second

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metal containing layer having a thickness of less than or equal to 20 angstroms. Chau et al. (Fig. 3J) discloses a metal-containing layer (214) with a thickness ranging from 10 to 25 angstroms (section [0016], lines 7-8)¹. It would have been obvious for one skilled in the art at the time of the invention to provide a layer as disclosed by Chau for the device of Tonti for the purpose, for example, of providing a layer thick enough to prevent impurities from diffusing into the gate dielectric layer, but thin enough as to not interfere with the function of the upper metallic layer (Chau; section [0016], lines 1-6).

In re claim 74, Tonti in view of Chau discloses the device of claim 73, wherein the first and second metal-containing materials predominantly comprise tungsten nitride, tantalum nitride and tungsten nitride (Tonti; column 3, lines 1-2; Chau, section [0027]).

In re claims 78-80, Tonti in view of Chau discloses the device of claim 69, but does not expressly disclose the second thickness being on the order of 100 or 150 angstroms. Chau, however, does disclose the desirability of using thicker diffusion barrier layers (section [0016]) for the purpose of blocking the diffusion of impurities into the gate dielectric layer. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a thicker diffusion barrier for the first metal-containing layer since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

In re claim 81, Tonti in view of Chau discloses the device of claim 69, wherein the semiconductor device is a part of an electronic system (Tonti; Summary of the Invention).

¹ This thickness dimension satisfied both limitations. The thickness for the first FET is disclosed to be greater than

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7. Claims 70-72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tonti/Chau as applied to claim 1 above, and further in view of Taylor, Jr. et al. (U.S. Patent No. 6,573,160 B2).

In re claims 70-72, Tonti in view of Chau disclose the device of claim 1 but does not expressly disclose the gate oxide layer comprising aluminum oxide. Taylor discloses the use of aluminum oxide and hafnium oxide (column 3, lines 57-67) as gate dielectric layer alternatives. It would have been obvious for one skilled in the art at the time of the invention to use a thin high-dielectric constant oxide as disclosed by Taylor for the device of Tonti/Chau for the purpose, for example, of increasing the capacitance of the device (Taylor; column 1, lines 23-30).

8. Claim 75 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tonti/Chau as applied to claim 73 above, and further in view of Lee (U.S. Patent No. 6,306,743 B1).

In re claim 75, Tonti in view of Chau discloses the device of claim 73, but does not expressly disclose the first and second metal-containing materials comprising tungsten silicide. Lee discloses a gate structure (29) comprising a tungsten silicide layer (25). It would have been obvious for one skilled in the art at the time of the invention to use a tungsten silicide layer as disclosed by Lee for the device of Tonti/Chau for the purpose, for example, of decreasing the resistance of the gate electrode.

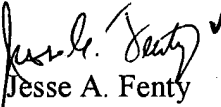
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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse A. Fenty whose telephone number is 571-272-1729. The examiner can normally be reached on 5/4-9 1st Fri. Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Jesse A. Fenty
Examiner
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